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ABSTRACT

"Preparing for Tomorrow's World" (PTW) is an interdisciplinary, future-oriented program incorporating information from the sciences/social sciences and addressing societal concerns which interface science/technology/society. The program promotes responsible citizenry with increased abilities in critical thinking, problem-solving, social/ethical reasoning, and decision-making. The socio-scientific reasoning model (SSRM) is the theoretical basis of the program. The model consists of four interacting components: (1) logical reasoning development based on Piagetian theory; (2) moral/ethical reasoning based on Kohlberg's stages; (3) Selman's views of social role taking stages; and (4) a content or informational component. SSRM serves as the basis for identifying the types of learning experience and the sophistication level of those experiences important to help students develop. A major instructional strategy related to SSRM is the dilemma discussion. Dilemmas, brief stories in which conflicting moral/ethical issues must be resolved, consist of six stages: background information, presentation of dilemma, selection of alternative positions, small group discussions, class discussion, and discussion summary/closing. Each of these steps is discussed, followed by some general guidelines for stimulating dilemma discussions and characteristics of any dilemma discussion. In addition, a list of helpful hints and answers to commonly asked questions (such as how long should a discussion be continued) are provided. (JN)

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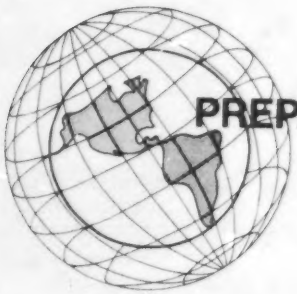

PREPARING FOR TOMORROW'S WORLD

CURRICULUM MODEL

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PREPARING FOR TOMORROW'S WORLD

Teacher's Guide

CURRICULUM MODEL

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INTRODUCTION

TO THE TEACHER:

We live in an exciting, rapidly changing, and challenging world—a world highly dependent upon science and technology. Our world is changing so rapidly that we sometimes fail to recognize that much of what we today take for granted as common, everyday occurrences existed only in the imaginations of people just a few short years ago. Advances in science and technology have brought many dreams to fruition. Long before today's school children become senior citizens, much of today's "science fiction" will, in fact, become reality. Recall just a few accomplishments which not long ago were viewed as idle dreams:

- *New biomedical advances have made it possible to replace defective hearts, kidneys and other organs.*
- *The first aire flight at Kitty Hawk lasted only a few seconds. Now, a little over half a century later space ships travel thousands of miles an hour to explore distant planets.*
- *Nuclear technology—of interest a few short years ago because of its destructive potential—could provide humankind with almost limitless supplies of energy for peace-time needs.*
- *Computer technology has made it possible to solve in seconds problems which only a decade ago would require many human lifetimes.*
- *Science and technology have brought us to the brink of controlling weather, earthquakes and other natural phenomena.*

Moreover, the changes which we have been experiencing and to which we have become accustomed are occurring at an increasingly rapid rate. Changes, most futurists forecast, will continue and, in fact, even accelerate as we move into the 21st Century and beyond. But, as Barry Commoner has stated, "There is no such thing as a free lunch." These great advances will not be achieved with a high price. We are now beginning to experience the adverse effects of our great achievements:

- *The world's natural resources are being rapidly depleted.*
- *Our planet's water and air are no longer pure and clean.*
- *Thousands of plant and animal species are threatened with extinction.*
- *Nearly half the world's population suffers from malnutrition.*

While science and technology have given us tremendous power, we are also confronted with an awesome responsibility: to use the power and ability wisely, to make equitable decision tradeoffs, and to make valid and just choices when there is no absolute "right" alternative. Whether we have used our new powers wisely is highly questionable.

Today's youth will soon become society's decision-makers. Will they be capable of improving upon the decision-making of the past? Will they possess the skills and abilities to make effective, equitable, long-range decisions to create a better world?

It is our belief that the *Preparing for Tomorrow's World* program—will help you the teacher prepare the future decision-maker to deal effectively with issues and challenges at the interfaces of science/technology/society. It is our belief that the contents and activities in this program will begin to prepare today's youth to live life to the fullest, in balance with Earth's resources and environmental limits, and to meet the challenges of tomorrow's world.

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The Theoretical Basis of *Preparing for Tomorrow's World:* The Socio-Scientific Reasoning Model

As pointed out in the Introduction to this guide, developments in science and technology are not without societal issues and problems. New developments and applications will inevitably bring about new issues as well as increase their complexity. Unlike scientific problems, socio-scientific problems often have no "correct" answer because they involve human choices and decisions. Such choices and decisions are value ladened. The particular decisions made today and tomorrow will determine the course of the future. Hence, we are faced with the profound challenge to make just and wise decisions in order to create a better future world. To help prepare our students to become more effective problem solvers and decision makers education will need to focus on the simultaneous development of the following skills:

- Ability to deal with problems containing multiple interacting variables
- Decision making that incorporates a wider social perspective
- Critical thinking in the evaluation of consequences and implications

Components of the Socio-Scientific Reasoning Model

In response to the above concern and recognizing the importance of this mode of development, we developed the "socio-scientific reasoning" model to serve as a framework in the production of our curriculum materials. This model combines our own philosophy, ideas and research with the theories and philosophies of Piaget, Dewey, Kohlberg and Selman. Basic to these theories is the idea of education as helping an individual grow both intellectually and morally. Therefore, this socio-scientific reasoning model approaches education from a developmental perspective. This model incorporates the ideas of stage development from the perspective of cognition, moral ethical reasoning and social role taking. The basic tenets of these theories are briefly summarized below.

Logical Reasoning

Jean Piaget, the noted Swiss psychologist, has made important contributions in the area of cognitive development which are pertinent to our efforts[1,2]. Piaget views the development of logical reasoning as progression through the series of stepwise stages indicated in Table I (sensori-motor, preoperational, concrete operational and formal operational). At each successive stage the logical reasoning ability of individuals takes on a broader perspective and incorporates the ability to deal with greater numbers of interacting variables of increasing intellectual complexity. Each stage of thinking builds upon the previous one, but takes on a new structural form. Growth in cognition, it seems, can be facilitated and nurtured through appropriate educational experiences.

In explaining growth in logical reasoning capability, Piaget refers to the processes of assimilation, accommodation, and equilibration. Assimilation occurs when the child incorporates new ideas and situations into his or her existing thought structures. On the other hand, the child also encounters objects and events that do not fit into his or her existing thought structures. In these contradictory situations, the child has essentially two options: he she must either enlarge his/her existing structures or create a new category or structure. Piaget defines this as the process of accommodation.

Intellectual growth, Piaget postulates, occurs when the individual attempts to resolve the tension between the interactive processes of assimilation and accommodation by developing new thoughts and responses that are more suitable or adequate. Equilibrium is re-established when thought structures are altered, producing new accommodations that enable the individual to assimilate the new situations. Intellectual growth, then, occurs through internal self-regulation processes that lead to new, higher levels of equilibration.

Moral/Ethical Reasoning

While there are several approaches to values education, the more encompassing one is the cognitive developmental approach offered by Lawrence Kohlberg[3,4]. Kohlberg's ideas are derived from the philosophic positions of Dewey and and Piaget. The emphasis here is to help individuals grow intellectually and morally. This is, we feel, a more functional approach than arbitrary indoctrination of values as used in "character" or "socialization" education or taking a "values relativity" stance, typically employed in the more common values clarification approach.

Kohlberg's moral/ethical development theory is an extension of Piaget's cognitive development theory. Similarly to Piaget, Kohlberg views moral development from childhood to adulthood as progression through a series of stages (Table 2). Each stage is characterized by a very different way of perceiving and interpreting one's experiences. At Kohlberg's Stage 2, for example, "right" and "wrong" are judged in terms of satisfying one's own needs and sometimes the needs of others if it is convenient to do so. Stage 3 type of reasoning centers around maintenance of approval in one's own social group. The orientation is towards conformity to group expectation. At the higher principled stages, reasoning takes into account concerns for the welfare of others in a broader context, and includes concerns for human dignity, liberty, justice, and equality—those very same principles upon which our Constitution is based.

Following Piaget, Kolhberg views development not as mere accumulation of information, but changes in thinking capabilities—the structures of thought processes. In the course of development, higher-level thought structures are attained and result in the extension of an individual's social perspective and reasoning capabilities. Applying higher levels of thinking to problems results in problem solutions that have greater consistency and are more generalizable. See Appendix detailing the stages of development.

Social Role-Taking Stages

The research of Robert Selman[5] indicates that social role taking ability is a developed capacity which also progresses in a series of stages from early childhood through adolescence. Role taking is viewed by Selman in terms of qualitative

changes in the manner a child structures his/her understanding of the relationship between the perspectives of self and others.

Using the open-ended clinical method of inquiry first applied by Piaget and then later by Kohlberg, Selman has identified and defined Stages 0 through 4 (age range is approximately 3 years to 15+ years). These stages are referred to as: Ego-centric Viewpoint (Stage 0), Social-Informational Role Taking (Stage 1), Self Reflection Role Taking (Stage 2), Mutual Role Taking (Stage 3), and Social and Conventional System Role Taking (Stage 4). Descriptions of the role taking stages appear in Table 3. Each of Selman's role taking stages relates closely to and parallels Kohlberg's moral reasoning stages.

Selman views the social role taking stages as a link between Piaget's logical reasoning stages and Kohlberg's moral reasoning stages. Just as Piaget's logical reasoning stages are necessary but not sufficient for attaining the parallel moral reasoning stages, a similarly necessary but not sufficient relationship appears to exist between the social role taking stages and parallel moral reasoning stages.

As Selman has pointed out, ". . .the child's cognitive stage indicates his level of understanding of physical and logical problems, while his role taking stage indicates his level of understanding of the nature of social relations, and his moral judgment stage indicates the manner in which he decides how to resolve social conflicts between people with different points of view".

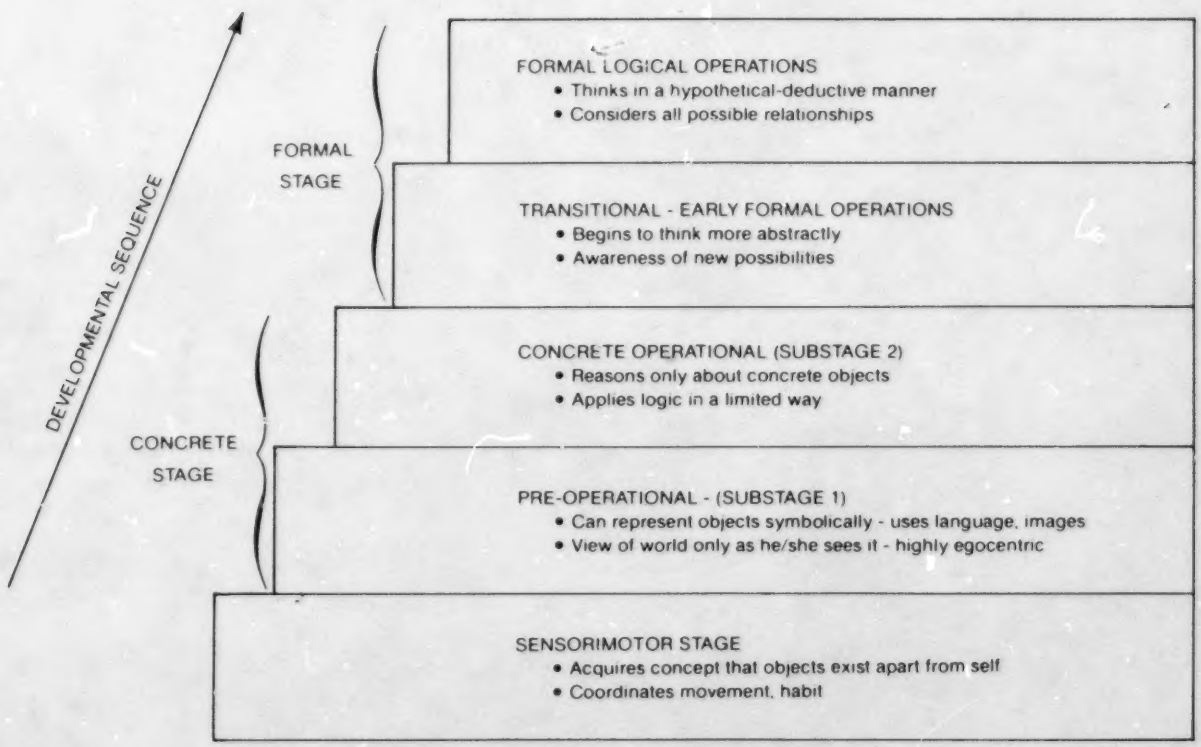
The Socio-Scientific Reasoning Model

Combining our own philosophy, ideas, and research with the theories of Piaget, Kohlberg and Selman, the socio-scientific reasoning model has been developed. Socio-scientific reasoning, as defined here, is the incorporation of the hypothetico-deductive mode of problem solving with the social and moral/ethical concerns of decision making. This model has served as a guide in the development of educational materials to help students advance to higher levels of thinking and reasoning capabilities. Moreover, it is highly flexible and readily adaptable to other classroom activities.

The basic assumption of this model is that effective problem solving requires simultaneous development in the realms of logical reasoning, social role taking, and moral/ethical reasoning. Purely objective scientific thinking cannot be applied in the resolution of most of the probable future conflicts without regard to the impact of those decisions on human needs and human goals. A technological solution, for example, may be, after critical analysis, feasible and logically consistent. From a societal perspective, however, one must question whether or not it should be applied. How to best prioritize our needs and evaluate trade-offs with a concern for the needs of future generations involves logical reasoning and critical thinking, but now with an added dimension . . . a social moral/ethical reasoning dimension.

Hence, the Socio-Scientific model consists of four interacting components (see Figure 1): (1) logical reasoning develop-

TABLE 1
PIAGET'S STAGES OF COGNITIVE DEVELOPMENT


DEVELOPMENTAL SEQUENCE
FORMAL STAGE
CONCRETE STAGE
FORMAL LOGICAL OPERATIONS
• Thinks in a hypothetical-deductive manner
• Considers all possible relationships
TRANSITIONAL - EARLY FORMAL OPERATIONS
• Begins to think more abstractly
• Awareness of new possibilities
CONCRETE OPERATIONAL (SUBSTAGE 2)
• Reasons only about concrete objects
• Applies logic in a limited way
PRE-OPERATIONAL - (SUBSTAGE 1)
• Can represent objects symbolically - uses language, images
• View of world only as he/she sees it - highly egocentric
SENSORIMOTOR STAGE
• Acquires concept that objects exist apart from self
• Coordinates movement, habit

ment is based on the theories of Piaget, while (2) moral/ethical reasoning relies strongly on Kohlberg's ideas. Selman's research provides the basis for the third component, the social role taking aspects of our model. Since the content or information component of the problem (component four) will vary, so too will the concepts vary accordingly. For example, in our applications of this model we have concentrated on issues at the interfaces of science, technology, and society. Of course, problem issues could also deal with or focus on any other topic one chooses to investigate.

The content component also consists of three interacting subunits. These subunits—science, technology, and society—rely on each other for their very existence. While each of the subunits is dependent upon the others, their individual underlying value structures create a high potential for discord since the concerns of one subunit often conflict with those of the

TABLE 2
KOHLBERG'S STAGES OF MORAL DEVELOPMENT

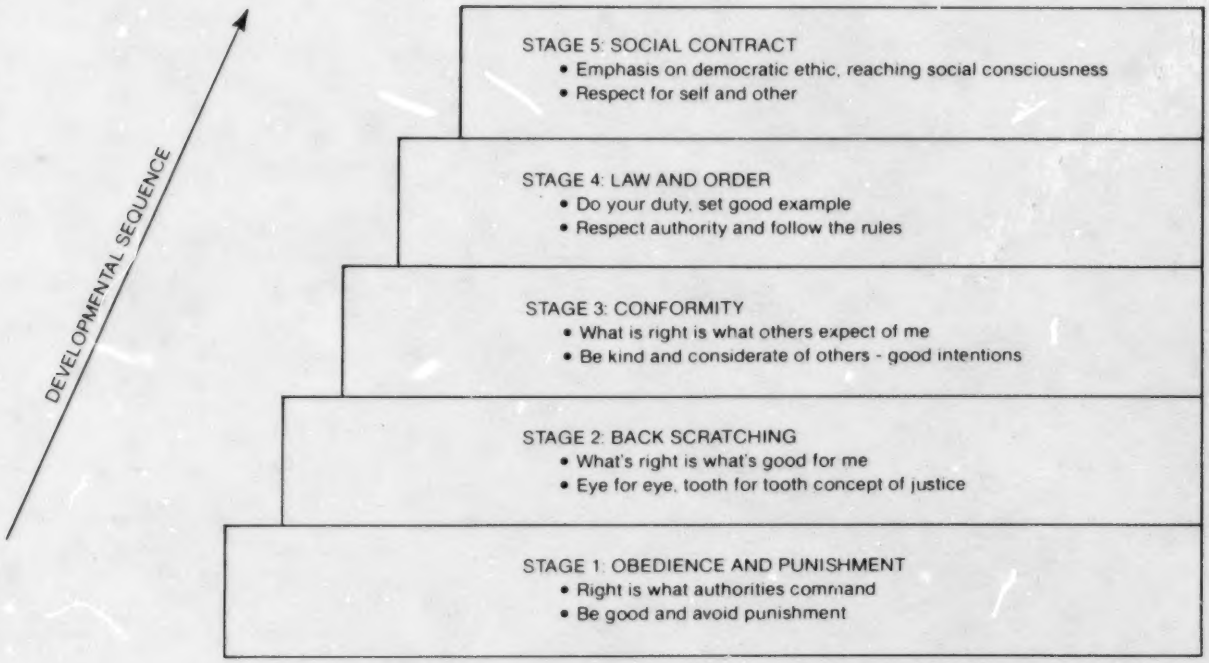

DEVELOPMENTAL SEQUENCE
STAGE 5: SOCIAL CONTRACT
• Emphasis on democratic ethic, reaching social consciousness
• Respect for self and other
STAGE 4: LAW AND ORDER
• Do your duty, set good example
• Respect authority and follow the rules
STAGE 3: CONFORMITY
• What is right is what others expect of me
• Be kind and considerate of others - good intentions
STAGE 2: BACK SCRATCHING
• What's right is what's good for me
• Eye for eye, tooth for tooth concept of justice
STAGE 1: OBEDIENCE AND PUNISHMENT
• Right is what authorities command
• Be good and avoid punishment

TABLE 3
SELMAN'S ROLE-TAKING STAGES

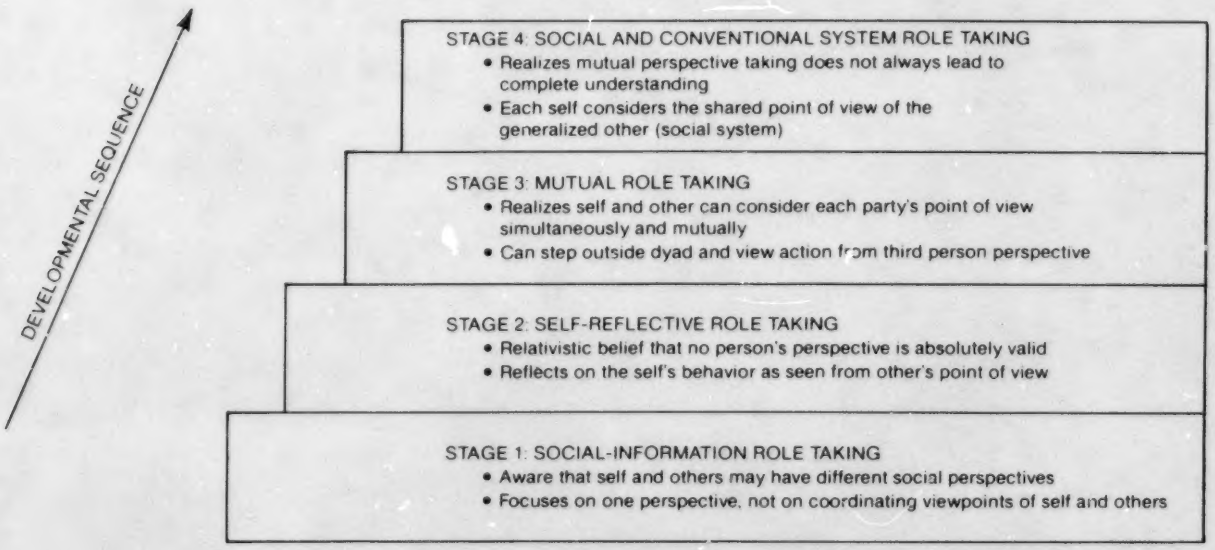
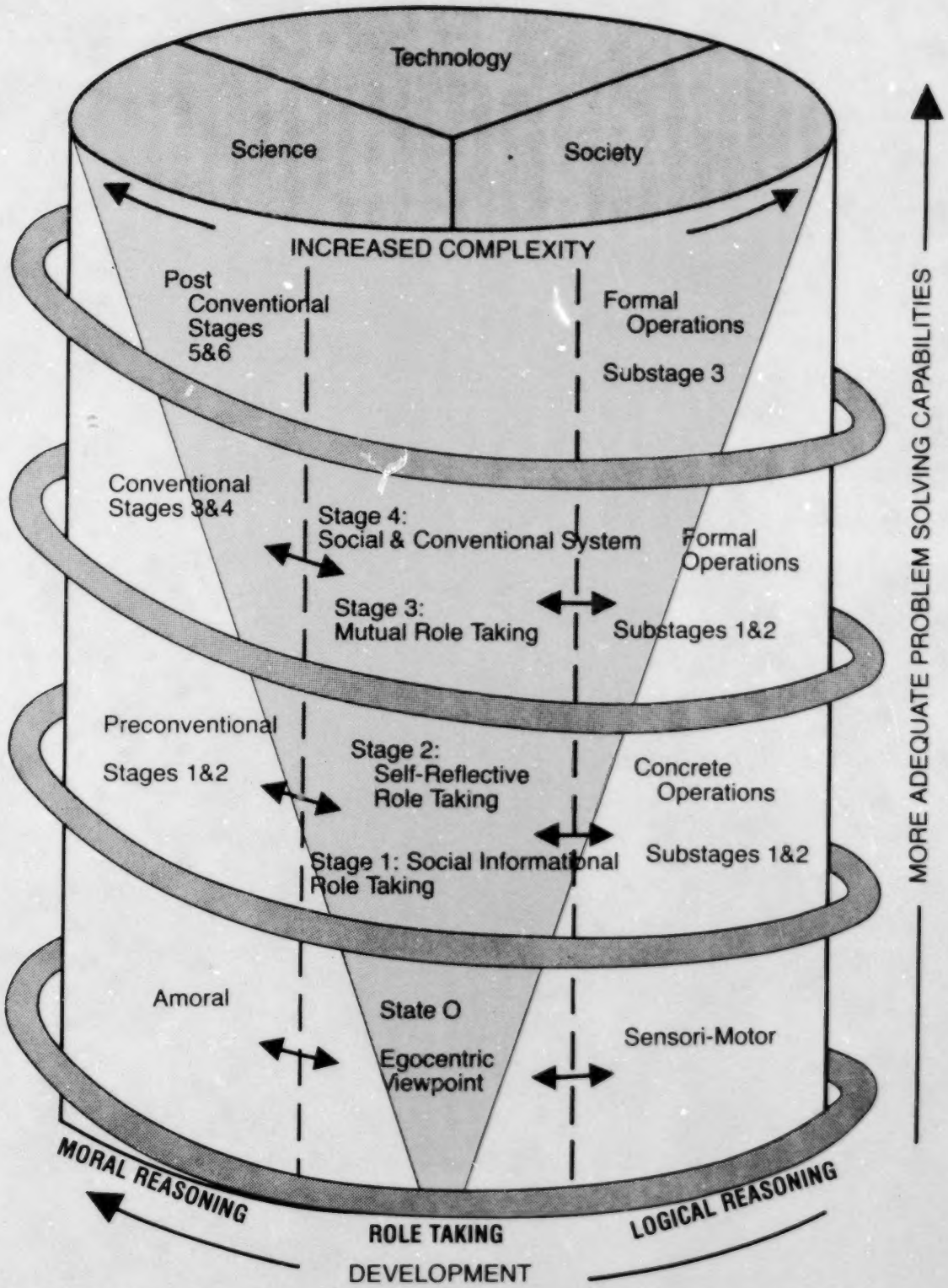

DEVELOPMENTAL SEQUENCE
STAGE 4: SOCIAL AND CONVENTIONAL SYSTEM ROLE TAKING
• Realizes mutual perspective taking does not always lead to complete understanding
• Each self considers the shared point of view of the generalized other (social system)
STAGE 3: MUTUAL ROLE TAKING
• Realizes self and other can consider each party's point of view simultaneously and mutually
• Can step outside dyad and view action from third person perspective
STAGE 2: SELF-REFLECTIVE ROLE TAKING
• Relativistic belief that no person's perspective is absolutely valid
• Reflects on the self's behavior as seen from other's point of view
STAGE 1: SOCIAL-INFORMATION ROLE TAKING
• Aware that self and others may have different social perspectives
• Focuses on one perspective, not on coordinating viewpoints of self and others

FIGURE 1

THE SOCIO-SCIENTIFIC REASONING MODEL



others. This paradox—dependence and simultaneous conflict among the subunits—presents a unique opportunity and context for curriculum developers employing the Socio-Scientific Reasoning model to prepare educational materials.

Each component of this model is not seen as a totally separate and distinct entity. Rather, each of the four components interacts with and has an effect on all other components. Thus, logical reasoning has an effect on, and in turn is affected by, social role taking development. In a similar manner, social role taking has an effect on, and is affected by, developments in the moral/ethical realm. Of course, logical reasoning and moral/ethical reasoning also interact. Each of these major components—logical reasoning, social role taking, and moral/ethical reasoning—interact not only with each other but with the fourth component, content or information.

Referring to Figure 1 again, the content cone is small at the low end because at earlier stages of development the number of concepts entertained are smaller and the concepts are simple in nature. Hence, as the cone broadens so too does the complexity of content or information included. Individuals at stages of development intersecting the lower end of the cone can deal with issues and concepts of a simpler form while, on the other hand, individuals at the upper end with higher levels of maturity have the capacity for dealing with more issues and issues of greater complexity. Development, then, is both vertical and horizontal: vertical development is from lower to higher stages; horizontal development relates to the "necessary but not sufficient" requirements which must be satisfied as one moves from logical reasoning, through social role taking, to moral reasoning capabilities.

Thus, while each stage reflects a distinctly unique capability for problem solving in a science/technology/society context, we view development or progress as a continuously spiraling process. In this process, however, there are leaps and quiesence, and fixation at any stage is possible. Levels of logical reasoning, moral reasoning, and role taking maturity also seem to vary, we find, depending on the issues addressed. These apparent inconsistencies in reasoning—even when dealing with the same or similar mental and moral constructs—seem to be related to the degree of emotionality, familiarity with, interest in, and/or knowledge about the issues under consideration[7].

The goal then is to help each individual "spiral" upwards through the Socio-Scientific Reasoning cone and synchronously achieve "more adequate" problem solving capability. "More adequate" as used here refers to the idea that when applied to problem solving, the higher stages of reasoning result in solutions that are more encompassing and generalizable; they enable students to deal with greater complexity.

Application of the Socio-Scientific Reasoning Model in the Classroom

The Socio-Scientific Reasoning model therefore serves as the basis for identifying the types of learning experience and the sophistication level of those experiences important to help students develop. It recognizes that learning capabilities differ with age, grade level, interest and learning needs. Implicit in the model and in accord with stage theory is the idea that at each stage there is a characteristic form of thinking capability which determines how experiences and information are interpreted and acted upon.

The main strategy underlying all of these activities is based on Piaget's concept of equilibration. It is only when disequilibrium is created that active restructuring of thought takes place. This active restructuring leads to growth in logical reasoning, in social role taking, and in moral/ethical reasoning capabilities as well.

Restructuring of existing cognitive structures occurs when internal disequilibrium is felt by the individual. New experiences and inputs which are not readily comprehensible to the individual challenge his/her existing mode of thought by revealing inadequacies or inconsistencies in that problem solving strategy[8]. Arrestment at a given stage is partially explained by the developmental theorists as the lack of opportunities that create conflict or dissonance which place the individual in a position where he/she needs to assess his/her particular mode of thinking. Perhaps, as Clive Beck points out, the reason why people do not develop morally is because they have not had the opportunity to entertain alternatives—their imaginations have not been extended[9]. We, in addition, contend that the reason people do not advance in logical reasoning can also be attributed, to a large degree, to a similar lack of opportunities.

We have identified some of the basic elements needed to provide experiential opportunities that promote development of problem solving and decision making skills. A partial listing includes providing opportunities for students to:

- Encounter a variety of viewpoints
- Experience higher level reasoning
- Take the perspective of others
- Examine and clarify one's own ideas
- Examine the consequences and implications of one's decisions
- Defend one's position
- Evaluate possible alternatives
- Consider and recognize the role of the self to society
- Reflect on one's own value system
- Test own ideas and those of others

One educational activity which incorporates some of these elements is the classroom dilemma discussion, an activity most commonly associated with Lawrence Kohlberg and his colleagues. We have, however, modified and extended this approach to more systematically encompass critical analysis and evaluation of information and data. We have also employed such other formats as role taking, simulations, and futures forecasting and analysis methodologies.

For example, reasoning at a particular stage is not a value judgment of whether an act is good or bad, but is the pattern of the concepts entertained in judging the "ought" of rights, duties and obligations of human relationships. Younger children at lower stages reason about duties in terms of reciprocal benefits from the party—"If you do me a favor, I will do you a favor." Whereas in principled reasoning, duty is what an individual has become morally committed to do and is self-chosen. Higher stage reasoning is therefore the ability to apply value concerns (Kohlberg's major concerns include self welfare, welfare of others, sense of duty and of motives, conscience, rules, punitive justice, role taking) in a more

internalized, complex, autonomous, critical, consistent and generalized manner.

Effective discussion, however, cannot take place in a vacuum. Needed also is an information base or context from which students can begin to analyze and evaluate information. With information which they have extracted and synthesized, additional ideas and rational arguments can be developed for discussion. For curriculum activities, we have created problem situations in a variety of contexts which, according to scholars in a variety of fields, will be prominent in the next quarter century and beyond[10]. This adds another perspective to the dilemma problem—that which elicits scientific logical reasoning in addition to moral/ethical reasoning—but in a futuristic context.

These serve as mechanisms for students to put some of the ideas and judgments that have emanated from the discussion into larger structural frameworks. They also provide students with opportunities to project into the future, to think beyond their own immediate experiences, and to consider the impact of different decisions on future society.

CONDUCTING DILEMMA DISCUSSIONS IN THE CLASSROOM

Since dilemma discussion may be a new classroom technique, its major characteristics, the basic guidelines, and some helpful suggestions will be described. There are no hard, fast rules for leading dilemma discussions. Most important is that both teacher and students feel comfortable participating in the activity. The following guidelines are merely recommendations drawn from experiences of persons who have conducted moral dilemma discussions in the classroom. These may or may not meet the entire requirements of your particular situation and needs. Adjustments and changes may be necessary so that the dilemmas and discussion format correspond to the intellectual level and interests of your students.

Basic Steps in the Process

The five basic steps in conducting a dilemma discussion as outlined by Kohlberg and his associates are as follows:

Presentation of the dilemma
Selection of alternative positions
Small group discussions
Class discussion
Summary and closing of discussion

Background Information—In our materials we have included an additional component—an information base. See Diagram 1, *Schema for Dilemma Discussion*. This background information will provide students with at least a basic understanding of the issues contained in the dilemma and therefore the substantive content which can be used to develop the discussion. Moreover, the background materials serve to bridge the gap between the real world and the hypothetical dilemma situation. Hence, the dilemma will be construed not simply as a story, but as a reflection of real societal concerns and value/moral conflicts that arise from our scientific/technological activities. Readings or other activities should therefore stimulate thinking and assist students in the formulation of their personal views regarding the action that the main character(s) in the dilemma should take.

The background information provided is by no means extensive, and you may find it desirable to include additional materials as the need arises. If you have readings or exercises which you feel are more suitable for your students, do not hesitate to substitute or supplement what has been included here. In addition, it may be necessary to discuss in class some of the more sophisticated concepts and technical terminology to insure that students have an understanding of the basic issues.

Our desire is to avoid encumbering students with too much technical detail and information. Nonetheless, some classes may wish to pursue certain topics in greater depth and should be encouraged to do so. From our experience, additional research on the part of the students helps to generate a livelier discussion that includes a wide diversity of perspectives.

Following each dilemma are a series of questions. These questions can serve to probe further into the issue or provide the basis for developing other dilemmas. The dilemmas, as presented, focus on a limited instance but, as educators are well aware, issues have many more ramifications and can be built upon to encompass a much more complex situation. Therefore, by proceeding from a simple situation, it is possible to increase the levels of complexity in a step-wise fashion with appropriate questions.

Provocative questions can also help students reflect on how they might be affected by certain decisions or policies and their roles as future decision-making citizens.

Presentation of the Dilemma—After the students have read the introductory material as a classroom or homework assignment, the dilemma can be presented. The dilemma may be read to the class as a whole, or else, each student can read the dilemma for himself/herself. At this point you may wish to determine if the students fully understand the dilemma. This can be identified by asking:

- Do you feel that this is a hard question to answer?
- Will someone please summarize the situation?
- What things might the main character have to consider in making a choice?
- What are the main points in the conflict?
- Who would be primarily affected by the decision?

Small Group Discussion—It is usually recommended that dilemma discussions be first conducted in small groups followed by discussion with the entire class. Students often are more willing to speak out in small rather than large groups. It offers individuals greater opportunity to speak out as well as places more responsibility on each person to contribute to the group's activities. The sense of informality in a small group allows for entertaining unique or unusual ideas that students may hesitate to bring up in a larger grouping for fear of ridicule or "put-downs."

DIAGRAM 1

SCHEMA FOR DILEMMA DISCUSSION

Teacher Activities		Student Activities
assign readings, exercises, etc.	BACKGROUND INFORMATION	readings, films, exercises
check students' understanding	PRESENTATION OF DILEMMA	identify situation, clarify terms
set up small groups	SELECT ALTERNATIVE POSITIONS	indicate preliminary action choice
help stimulate discussion (probe questions)	SMALL GROUP DISCUSSION	examine individual reasons react to probe questions
coordinate class focus (probe questions)	CLASS DISCUSSIONS	examine different reasons - group reports discuss issues, consequences, implications
bring discussion to close, summarize main reasons	SUMMARIES	present main ideas, reasons - review discussion
determine types of relevant activities	EXTENSION ACTIVITIES (optional)	further research, essays, analogous dilemmas, etc.

Homogeneous Grouping—The small discussion groups (four to six students) may be formed in a number of ways. From a show of hands or written answers students who vote "yes" or "no" on the question can be identified and grouped according to their position. There should be enough heterogeneity among class members to create division on the question and formation of the small discussion groups.

Small groups where members hold similar positions would provide a more congenial atmosphere for initiating discussion. Here the students will feel less threatened if their peers share the same action decision and be more willing to contribute to the conversation. The membership would be more supportive, and individuals would not sense a fear of attack or failure.

Heterogeneous Grouping—In another format, students may be arbitrarily grouped. Here they have the additional task of evaluating analyzing, criticizing and challenging the reasons given in the alternative choices. In this approach the degree of controversy is heightened, creating the potential of generating a livelier exchange. In defending a particular choice, the student will need to come up with more convincing reasons in order to persuade the others to support his/her side. Or the group might begin by using a "brainstorm" session and generate a series of supporting reasons for the different positions. These responses can then be examined and compared with one another. Through an elimination process, the group can select the more compelling arguments for each position.

Whatever grouping strategy you decide to employ, all the groups should focus on the moral issues of the dilemma. To more personally involve students in the group discussion have them first express their feelings about the dilemma. Some preliminary questions for consideration might include:

- What issues in the dilemma are hard to talk about? What makes them difficult to discuss?
- Can you foresee yourself having to make such a decision?
- Do you know anyone who has had to make a similar decision?
- Have you recently read any news articles about similar dilemmas?
- How do you think you would feel if you had to make such a decision?
- When you have a problem, how do you think it through?

Once the students become comfortable with the discussion format, they can then begin to critically discuss the position taken and the supporting reasons. They should consider the adequacy of the reasons given as well as the adequacy of their own reasons. After stating comparing and evaluating each of the reasons, they might select two or three of those that they believe best support the position taken on the dilemma issues. Each of the dilemmas contains two or more major moral issues. It is important that the students recognize the issues within a dilemma and direct their attention to the issues and not to the irrelevant aspects of the dilemma (i.e., speculating on the reality of such a situation).

If a group has difficulty in getting started or if discussion begins to lag, the teacher can interject a probe question or two to activate conversation. (See the discussion below on the different types and uses of probe questions.) Sample probe questions are listed at the end of each dilemma and may be used selectively as needed. It is often useful to have students answer a few of probe questions as a written assignment prior to the group discussion. In this way, students have time and opportunity to reflect on the issues and become more constructive contributors to the dialogue.

A recorder should be selected to list the group's conclusion to be presented in a written or verbal form for the entire class discussion.

Class Discussion—The entire class reconvenes to hear the comments made in the various groups. The discussion results of each of the groups are presented for the entire class to examine. They might be best displayed on the chalkboard or overhead projector. This procedure presents the opportunity for students taking opposing views to ask questions and challenge the different viewpoints. Again, the adequacy of the reasons are critically analyzed and merits of each discussed. Students reasoning at lower levels will be exposed to higher level reasoning and discover that their reasons may not have taken wider implications into consideration and hence be less appropriate for resolving the conflict.

The class as a whole can then choose the best reasons for each position. You will find that although students may not be able to generate higher level reasons they will tend to prefer reasons one stage higher than their own.

The class discussion is most fruitful if the discussion guides students to explore ideas they have not considered and to think about those higher level reasons. This can be accomplished through the use of probe questions. There are basically seven types of probe questions:[1]

1 *Clarifying probe:* Asking student to explain what he/she means in his/her statement. "What do you mean when you say that concealing evidence is immoral? What is the meaning of *immoral?*"

2 *Perception checking probe:* Determining whether student understands a statement made by another individual. "Please explain to me what Joe has just said."

3 *Issue specific probe:* Examining student's thinking on the major issues (Kohlberg has identified ten that underlie moral reasoning—see Table 4). "Why should the government establish standards for air quality? What should good guidelines take into account?" (Issues: governance and law)

4 *Inter-issue probe:* Resolving conflict when two or more issues appear to be at odds. "Should a richer country be allowed to use a greater share of the earth's resources?" (Issues: social justice, life, property)

5 *Role switch probe:* Placing student in the position of someone involved in the dilemma. "What would you do if you had to make that decision?"

6 *Universal consequences probe:* Considering the implication of the judgment made when applied to everyone. "What might happen if every household were required to reduce its use of electricity by 30%? Is it fair to place such demands on everyone?"

7 *Reason seeking probe:* "How did you come to this conclusion?" or "Why?"

Questioning along these lines will lead students to broaden their scope of thinking and to evaluate effects and consequences of different solutions. It offers them an opportunity to see

how others might think about the same issue and challenges them to consider the many sides of an issue.

Probe questions can also be used to develop alternative dilemmas or introduce more abstract ideas by increasing the complexity of the dilemma. For instance, a dilemma involving personal sacrifices in a gasoline rationing situation might be extended to consider social and life-style changes in our highly mobile society. How should transportation fuel be best allocated? Does private and public interest conflict if gasoline were rationed? Dilemmas of an inter-personal nature can thus be presented from a community, national or even inter-global perspective to stimulate thinking about future implications for human society.

Skillful questioning becomes the tool to aid students to think critically—analyzing the positions they take and the values inherent in their position. They should begin to discover the significance of their principles by relating those principles to specific decisions and situations. Is government severely limiting our freedom of choice when it enacts safety regulations? What should freedom mean? What is the relationship between freedom and responsibility? What should be the role of government in protecting the health and welfare of future society? The constant interplay between the abstract principles concepts and specific instances is pertinent in making the dialogue a thoughtful, meaningful exercise. Students need to understand concepts on their own terms before they can integrate new concepts and ideas into their thought structure. The process of development is one where students actively experience (or think about) new ideas which in turn interact in restructuring the form of thinking.

Discussion should also include analysis of the information and facts given. How does the information influence the decision? What is inferred from the information presented? Were the facts provided sufficient for informed decision making? What additional information is desirable? How might one go about acquiring additional knowledge? On what basis does one sort out and analyze the facts given? To what degree does the information influence the decision towards one position or another?

Finally, the consequences and implications must be appraised. This is the test of the effects of the position taken; again values are weighed. What values are held? What makes them desirable? What are the priorities? How is the nature of human society perceived?

Closing the Discussion—The discussion can be closed with a simple summary statement of the major points made. This summation will help the student bring together the ideas entertained during the discussion into sharper focus. One approach is to write down the list of the major reasons/arguments "pro" and "con". The reasons most preferred by the students can be indicated, or the reasons can be rank ordered.

The different positions on the dilemmas should not be judged for that would imply a correct answer. A "right" answer would also defeat the purpose of future discussions; students will try to "second guess" the optimum position response. However, at this time the students should have another opportunity to choose reasons they personally prefer or find most persuasive. This decision need not be openly declared. Suggest that the students examine their original reasons after hearing the other comments. What might they wish to change or add?

It may be appropriate at this time to point out some actual situations that resemble the hypothetical dilemma. How were they resolved and what were some of the results? Students may begin to notice analogous dilemmas that are currently making the news headlines. It is a good idea to take every opportunity to relate concepts discussed in class to the students' personal experiences and levels of interest.

Some General Guidelines for Dilemma Discussion

Dilemma discussions should flow naturally and comfortably. However, when students have had little exposure to open-ended types of discussions, it is often difficult to engage them in in-depth exploration of an issue. The following are some pointers that might be useful in stimulating discussion.

Goals of Moral Discussion—Barry Beyer, who has written extensively on moral discussion techniques, has pointed out that the goals of moral discussion should contribute to the overall objectives of the course and general educational goals, in addition to introducing new ones. Hence these goals are general rather than narrow in nature. Among these are: 1) improving learning skills, 2) improving self-esteem, 3) improving attitudes toward school, 4) improving knowledge of key concepts, and 5) facilitating stage change.[12]

An important teaching strategy is to encourage students to think about and reflect on alternatives and consider different ideas. The process of development includes extending one's imagination and exploring one's thinking.[13]

Classroom Atmosphere—Every effort should be taken to create an atmosphere conducive to an open, free exchange of ideas. Students should feel at ease when expressing their thoughts and, when confronted with challenge, not feel that they are being attacked personally. The emphasis is on analyzing the reasoning process by considering divergent viewpoints and alternative choices. It would be stressed that no one answer is correct or absolute; each position has merits and invites investigation.

Classroom furniture should be arranged in such a way that students can speak directly with one another and can be easily heard. For small group discussions the chairs might be arranged in a number of small circles so that attention can be given to all members of the group with-out delineating an authority focal point. The seating should also offer some degree of flexibility so that students might be able to shift groups or share their thoughts with members of other groups. A student who is uncomfortable with one group or who wished to take the opposing position may want to move to another group.

Role of Teacher—The teacher's crucial role in dilemma discussions is that of a creative process facilitator whose function is to stimulate students' searching and "stretching," and help students embark on their own personal search. A key skill lies in sensitive listening. By listening with care and delaying action the teacher can begin to:

- Identify problems that students may have in coming to grips with the issues—do the questions need further clarification?

• Identify students who monopolize or dominate the conversations;

• Find students who are hesitant in expressing their ideas;

• Prevent the discussion from becoming a clash of personalities;

• Find when the discussion begins to lag or focuses on irrelevant details, etc.

By posing questions to the group or certain group members, the teacher can then provide helpful guidance or gently direct the course of the discussion.

At all times it is important that the teacher be supportive and reinforce in a positive manner. Students should not be singled out as having given particularly "good" or "bad" answers. Each response should be taken as a point of departure for further discussion. The question "why" should be the dominant concern.

Some degree of structure in a discussion is necessary but structure should never hinder the flow of ideas. Probe questions can serve as the guiding structure, but they need not be taken in any order or progress in a stepwise fashion. For a given group of students some questions may stimulate more interest or controversy than others, the less fruitful questions, therefore, need not be pursued.

Promoting student to student interaction is another major role of the teacher, requiring insight and patience. The discussion process is an evolutionary one, often requiring much time before a definitive direction can be perceived. At times it may even appear that the discussion is circuitous, but it is imperative that each student has the opportunity to air his/her views and partake as an active member of the group. The student, when he/she becomes confident in himself/herself and recognizes the worth of his/her ideas, will then accept the responsibility of his/her role in the group as well as become more receptive to the ideas of others.

Characteristics of Dilemma Discussion

• *Open-ended approach:* There is no single "right" answer. The goal is not to reach agreement but to critically discuss the reasons used to justify a recommended action. The emphasis is on *why* some reasons may be more appropriate than others.

• *Free exchange of ideas:* Students should feel comfortable in expressing their thoughts. Each student should have an opportunity to contribute to the discussion within a non-judgmental atmosphere.

• *Student to student interaction:* The conversation is primarily between student and student, not teacher and student. The teacher uses questions to guide the discussion and to encourage students at adjacent stages of moral reasoning to challenge one another. Lecture or recitation should be avoided.

• *Development of listening and verbal skills:* Each student should be intimately engaged in the discussion activity, building and expanding on one another's ideas as well as examining each response critically.

• *Focus on reasoning:* Reasons are to emphasize the prescriptive "should" rather than the "would" arguments.

• *Dilemmas produce conflict:* Conflict heightens student involvement and interest and should have a personalized meaning for the student. Resolution of internal conflict is a precondition for advancement to higher stage reasoning.

Helpful Hints

• Review carefully the dilemma to be discussed in class and try to anticipate any problems that students might encounter when dealing with the dilemma.

• Identify the main issues and list a few questions that might help clarify the issues for the students (particularly, how these issues might relate to the students' lives).

• Determine if there are words or concepts that may be unfamiliar to your students. These should be defined and discussed so that the students do not become overwhelmed by the terminology and can more easily grasp the essence of the problem.

• If you have readings which you feel are more pertinent or appropriate, use them in place of those included here.

• Consider whether or not the dilemma poses conflict for your students. It is often possible that the dilemma as written is either too sophisticated or too simplistic, and the students cannot appreciate the implicit conflict. The dilemma question might be reworded or altered in order to elicit a division of opinion among the students.

• When presenting the dilemma story make sure the students understand the problem and the goal of the discussion activity. This can be accomplished by having a student summarize the story and list some of the possible alternatives available to the main character(s).

• If a class is not accustomed to discussion-type activities, it might be wise to group the students in such a way that those who are more vocal and aggressive do not dominate or monopolize the discourse. Try to balance each group with different personality characteristics.

• When the discussion has difficulty getting started or gets bogged down, have the students role-play the main character. The shift in focus can assist them in gaining additional perspective into the situation.

• Try not to be too impatient if the discussion does not seem to go anywhere. As in any other type of group interaction, some warm-up time is necessary so that students can relax and reflect on their own thoughts.

• Students may continually look to you as teacher for direction and "correct" answers. When asked a question you can shift the attention by posing that question to another student and seek his/her opinion. In this way the dynamics of student interaction can be maintained.

• Tape recording some of the student dialogue may be useful as an evaluation tool to help organize future discussions and suggest additional probe questions.

• It is important that the discussion does not drift aimlessly or become a clash of personalities. Skillful interjection of probe questions will provide direction to the group discussion; therefore, become familiar with the different types of probe questions so that you can use them with fluency.

Questions Commonly Asked

• *In order to lead dilemma questions, do teachers need to identify the stage at which a student reasons?*

No, there is usually enough heterogeneity within a classroom so that several stages of reasoning are represented. Most important is to encourage different students to engage in the dialogue and to bring out the many different ways to resolve a problem.

• *What if everyone in the class takes the same position?*

This does not present any difficulty. The particular position taken is not important; what is important is the argument used to support the position. The different levels of reasoning on the dilemma should provide sufficiently lively debate. Students can also be asked to put themselves in the other position and develop arguments to support that position.

• *Should students be required to give reasons for their decisions?*

No, if reasons are not volunteered, you can simply ask another student to comment. The debate should not be forced but evolve naturally.

• *How does one detect student growth?*

Development is a slow process and a limited number of classroom dilemma discussions is not expected to advance students from one stage to the next overnight. However, students having experienced a diversity of alternative ideas should begin to develop an increasingly more global orientation and consider the different aspects of a problem.

• *Will a student reasoning at higher levels regress and accept the reasons of a more forceful lower stage argument?*

No, regression is not consistent with the stage theory. Persons reasoning at higher stages will see their argument reinforced as the discussion continues. Their reasons can deal more effectively with the question over a broader variety of situations; lower stage reasons begin to fall short. Studies have demonstrated that higher reasons are preferred over lower reasons.

• *How long does one continue the discussion?*

Discussion should continue for as long as it is fruitful and students continue to display a level of interest and involvement.

• *Is the object of the discussion to convince the class to accept higher level reasons?*

No. Simply "parroting" higher stage reasons does not effect or indicate growth. A stage reflects one's dominant mode of thinking on moral issues, one that is utilized. The purpose of the discussion is to provide new exposures and create a state of disequilibrium so that individuals begin to rethink and restructure. Discussion facilitates the course of development; it does not dictate it.

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APPENDIX

Stages of Moral Development

PRECONVENTIONAL LEVEL

At this level the child is responsive to cultural rules and labels of good and bad, right and wrong, but interprets the labels in terms of either the physical or the hedonistic consequences of action (punishment, reward, exchange of favors) or in terms of the physical power of those who enunciate the rules and labels. The level is divided into the following two stages:

STAGE 1

The punishment and obedience orientation. The physical consequences of action determine its goodness or badness regardless of the human meaning or value of these consequences. Avoidance of punishment and unquestioning deference to power are valued in their own right, not in terms of respect for an underlying moral order supported by punishment and authority (the latter being stage 4).

STAGE 2

The instrumental relativist orientation. Right action consists of that which instumentally satisifies one's own needs and occasionally the needs of others. Human relations are viewed in terms as those of the market place. Elements of fairness, of reciprocity, and of equal sharing are present, but they are always interpreted in a physical, pragmatic way. Reciprocity is a matter of "you scratch my back and I'll scratch yours," not of loyalty, gratitude, or justice.

CONVENTIONAL LEVEL

At this level, maintaining the expectations of the individual's family, group or nation is perceived as valuable in its own right, regardless of immediate and obvious consequences. The attitude is not only one of conformity to personal expectations and social order but of loyalty to it, of actively maintaining, supporting, and justifying the order, and of identifying with the persons or group involved in it. At this level, there are the following two stages.

STAGE 3

The interpersonal concordance of "good boy - nice girl" orientation. Good behavior is that which pleases or helps others and is approved by them. There is much conformity to stereotypical images of what is majority or "natural" behavior. Behavior is frequently judged by intention—"he means well" becomes important for the first time. One earns approval by being "nice."

STAGE 4

The law and order orientation. There is orientation toward authority, fixed rules, and the maintenance of social order. Right behavior consists of doing one's duty, showing respect for authority, and maintaining the given social order for its own sake.

POSTCONVENTIONAL OR PRINCIPLED LEVEL

At this level, there is a clear effort to define moral values and principles which have validity and application apart from the authority of the groups or persons holding these principles and apart from the individual's own identification with these groups. This level again has two stages, which are as follows:

STAGE 5

The social-contract legalistic orientation, generally with utilitarian overtones. Right action tends to be defined in terms of general individual rights and standards which have been critically examined and agreed upon by the whole society. There is a clear awareness of the relativism of personal values and opinions and a corresponding emphasis upon procedural rules for reaching consensus. Aside from what is constitutionally and democratically agreed upon, the right is a matter of personal "values" and "opinion." The result is an emphasis upon the possibility of changing law in terms of rational considerations of social utility (rather than freezing it in terms of stage 4 "law and order"). Outside the legal realm, free agreement and contract is the binding element of obligations.

STAGE 6

The universal ethical principle orientation. Right is defined by the decision of conscience in accord with self-chosen ethical principles appealing to logical comprehensiveness, universality, and consistency. These principles are abstract and ethical (the Golden Rule, the categorical imperative); they are not concrete moral rules like the Ten Commandments. Instead, these are universal principles of justice, of the reciprocity and equality of human rights, and of respect for the dignity of human beings as individual persons.

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PREPARING FOR TOMORROW'S WORLD

AN INTERDISCIPLINARY CURRICULUM PROGRAM

CONTEMPORARY AND FUTURE ISSUES CONFRONTING TECHNOLOGICAL SOCIETY

Institute for Science, Technology and Social Science Education
The Center for Coastal and Environmental Studies
Rutgers • The State University of New Jersey
Doolittle Hall
New Brunswick, New Jersey 08903

COASTAL DECISIONS: DIFFICULT CHOICES

Junior High/High School

Human activities along the coastal area are considered in light of increasing pressures and competing interests. Land use, resource preservation and allocation, potential changes are included in the topics of the module.

Materials

* teacher's guide
* 2 filmstrips and audio tapes
* worksheets/transparencies

Objectives

to develop:

* knowledge about the coastal area as a valuable and limited resource
* awareness of the impact of current and future activities
* skills in analysis and decision making

Student Activities

* small and large group discussion
* role play simulation
* scenario writing

Complements

* social studies
* earth science, general science
* language arts
* biology and marine science

ENERGY: DECISIONS FOR TODAY AND TOMORROW

Junior High/High School

Issues surrounding energy production, consumption and conservation are explored using examples from three energy sources: petroleum, nuclear power and coal. Problems and concerns arising from the utilization of these three energy sources are highlighted in dilemma discussions and role play simulations.

Materials

* teacher's guide
* student's guide
* worksheets/transparencies

Objectives

to develop:

* knowledge about energy and its issues
* awareness of energy concerns and their social, political and economic interactions
* analysis skills
* decision making skills

Student Activities

* graphing and data analysis
* critical reading and analysis of issues
* small and large group discussion
* role playing

Complements

* social studies
* general science, earth science
* health education

FUTURE SCENARIOS IN COMMUNICATIONS

Junior High/High School

Compares the development of two communication systems, past and future, and their impact on changes in life-styles. Introduces students to future forecasting techniques: Delphi probe, trend extrapolation, cross impact analysis, scenario writing, and others.

Materials

* teacher's guide
* student's guide
* worksheets/transparencies

Objectives

to develop:

* knowledge of modern communications as a system network
* awareness of new technologies and their impact on life-styles
* skills in decision making
* use of future forecasting techniques

Student Activities

* small and large group discussions
* futures forecasting
* role playing

Complements

* social studies, history
* general science
* language arts

OK SPACE ENCOUNTERS

Junior High/High School

Some of the problems created by the interaction of science, technology and society are explored in a simulated space mission. Students assume the role of astronaut-scientist and encounter a series of conflict situations that they need to resolve.

Materials

* teacher's guide
* film strip and audio tape
* worksheets

Objectives

to develop:

* knowledge about issues inherent in a highly technological society
* proficiency in the evluation and interpretation of information
* resolution of value conflicts
* skills in critical thinking and decision making

Student Activities

* role play simulation
* science fiction reading
* development of alternative solutions
* small and large group discussions

Complements

* social studies, anthropology
* general science, earth science
* language arts

TECHNOLOGY AND CHANGING LIFE-STYLES

Junior High/High School

Life-styles of a low technology (American Indian) and a high technology (modern day American) society are considered from the perspective of the family, education and natural resource utilization. Students examine value priorities that characterize the two societies.

Materials

* teacher's guide
* student's guide
* worksheets

Objectives

to develop:

* knowledge about the interaction of technology and life-styles
* skills in value analysis
* skills in decision making

Student Activities

* critical reading and issue analyses
* role playing
* small and large group discussion
* scenario writing

Complements

* social studies, history
* general science
* language arts

PERSPECTIVES ON TRANSPORTATION

Junior High/High School

Examines how modern transportation systems and new technological developments affect society and culture. Transportation issues and problems are explored in relation to social and environmental changes.

Materials

* teacher's guide
* student's guide
* filmstrip and audio tape
* worksheets

Objectives

to develop:

* knowledge of transportation issues
* awareness of problems associated with modern transportation
* skills in critical thinking and decision making

Student Activities

* critical reading and analysis
* scenario writing
* large and small group discussion

Complements

* social studies
* general science, environmental studies
* language arts

PEOPLE AND ENVIRONMENTAL CHANGES

Junior High/High School

How people have modified the environment, intentionally and inadvertently, is examined. Among the topics discussed are weather modification, dam construction, desertification, erosion and air pollution.

Materials

* teacher's guide
* student's guide
* worksheets

Objectives

to develop:

* knowledge about man's role in environmental changes
* awareness of present and future environmental changes
* skills in critical thinking and decision making

Student Activities

* critical reading and analysis of issues
* simulation game
* role playing
* small and large group discussion

Complements

* biology, environmental studies
* earth science, health education
* social studies, work affairs
* English, language arts

ENVIRONMENTAL DILEMMAS: CRITICAL DECISIONS FOR SOCIETY

High School

A case study approach utilizing specific dilemmas to highlight environmental concerns, their present and potential implications and alternative choices. Twelve topic areas include natural resource management, allocation of scarce resources, radiation hazards, toxic chemicals, energy resources, etc.

Materials

* teacher's guide
* student's guide

Objectives

to develop:

* knowledge of environmental issues
* awareness of technical and social aspects of environmental problems
* analytical skills in decision making

Student Activities

* critical reading and analysis of issues
* small and large group discussions

Complements

* general science
* environmental studies
* social studies

OF ANIMALS, NATURE AND PEOPLE

High School

Relationships and interactions of humans with animals and nature are examined. Discussion topics include the rights of animals and nature. Questions are raised regarding the need to evolve and "environmental ethic."

Materials

* teacher's guide
* student's guide
* worksheets

Objectives

to develop:

* knowledge of the interdependence of man and nature
* awareness of human attitudes and behavior towards nature
* skills in critical analysis, decision making, negotiating and debating

Student Activities

* critical reading and analysis of issues
* role play simulations
* law making
* small and large group discussions

Complements

* social studies, international studies
* general science, biology, environmental studies
* English, language arts

BEACON CITY: AN URBAN LAND-USE SIMULATION

High School

A student role-playing simulation set in an urban coastal community. Students develop proposals for the optimal use of a redevelopment site. Natural resources and social, political and economic factors and their interactions are considered in the decision making process.

Materials

* filmstrip and audio tape
* teacher's guide
* student materials - data pak, including role cards, readings, worksheets, overlay maps, reserach materials

Objectives

to develop:

* knowledge of factors involved in land use planning
* role taking perspective
* skills in planning and decision making

Student Activities

* developing role perspective
* analyzing issues
* preparing proposal for presentation
* debating and negotiating

Complements

* social studies, history
* geography, urban studies
* environmental planning, earth science

DILEMMAS IN BIOETHICS

High School

Case studies of current and potential issues related to applications of new technologies in biology and medicine. Legal, social and ethical questions are raised. Twelve topic areas include organ transplantation, drug experimentation, genetic research, genetic screening, patient selection for new medical procedures, application of new life-saving procedures, etc.

Materials

* teacher's guide
* student's guide

Objectives
to develop:

* knowledge in areas of biology, medicine and genetics
* awareness of social, political and economic issues in new technological applications
* analytical skill in decision making

Student Activities

* critical reading and analysis of issues
* small and large group discussions

Complements

* biology, biochemistry
* chemistry
* sociology, psychology
* health education

TECHNOLOGY AND SOCIETY: A FUTURISTIC PERSPECTIVE

High School

An examination of the future of technology and its values and ethical implications. The role and responsibility of scientists, politicians and individual citizens in scientific/technological decision making are emphasized.

Materials

* teacher's guide
* student's guide
* worksheets
* cards for simulation game

Objectives

to develop:

* knowledge of potential technological applications
* role-taking perspectives
* skills in decision making
* skills in future forecasting

Student Activities

* simulation of technology assessment committee
* preparing proposals for alternative futures
* scenario writing

Complements

* social science, history
* language arts
* general science, chemistry

CHARACTERISTICS OF THE MODULES

* FREE STANDING - May be used as a separate unit of study, mini-course or incorporated into existing curriculum where appropriate.

* INTERDISCIPLINARY - Incorporates information and concepts from the sciences and social sciences, and addresses societal concerns which interface science, technology, and society.

* FUTURE ORIENTED - To promote responsible citizenry with increased abilities in critical thinking, problem solving, social/ethical reasoning and decision making.

* SELF-CONTAINED - All materials necessary for conducting modules are included.

* FLEXIBLE - Designed to complement a number of subject areas. Activities may be used in a continuous, uninterrupted sequence, or at intervals throughout a unit of study or semester.

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	PRICE	QUANTITY ORDERED	PRICE	QUANTITY ORDERED
Coastal Decisions: Difficult Choices (JH/SH)	75.00		16.00	
Energy: Decisions For Today & Tomorrow (JH/SH)	70.00		5.00	
Future Scenarials In Communication (JH/SH)	85.00		9.00	
Space Encounters (JH/SH)	55.00		11.00	
Technology & Changing Life-styles (JH/SH)	85.00		11.00	
Perspective On Transportation (JH/SH)	87.00		7.00	
People & Environmental Changes (JH/SH)	75.00		2.00	
Environmental Dilemmas: Critical Decisions (SH)	95.00		--	
Of Animals, Nature & People (SH)	95.00		2.00	
Beacon City: An Urban Land Use Simulation(SH)	70.00		--	
Dilemmas In Bioethics (SH)	90.00		--	
Technology & Society: A Futurestic Perspective (SH)	80.00		4.00	

Additional and replacement Student Guides, Teacher Guides, Film Strips and Audio Tapes are available on request.

Modules include all items listed in Preparing for Tomorrows World brochure. When listed as part of the module, twenty five student guides are included.

*A complete classroom set (30 copies each sheet).